Negative Pressure Wound Therapy (Vacuum-Assisted Wound Closure)

MCG Health
Ambulatory Care
30th Edition

ACG: A-0346 (AC)
Link to Codes

This MCG care guideline may overlap CMS guidance located in CMS statutes and regulations that are not currently part of MCG's Medicare Compliance content. For Medicare Advantage beneficiaries, before referring to MCG care guidelines, users should first follow all guidance related to this topic located in CMS National Coverage Determinations (NCDs), Local Coverage Determinations (LCDs), and other statutes and regulations. Content used in MCG care guidelines may be used to supplement but does not replace, modify, or supersede existing Medicare regulations or applicable NCDs or LCDs.

Clinical Indications

- Negative pressure wound therapy (vacuum-assisted wound closure) may be indicated for **1 or more** of the following(1)(2)(3):
  - Initiation of therapy, as indicated by **ALL** of the following:
    - Wound,[A][B] as indicated by **1 or more** of the following:
      - Diabetic ulcer or wound, as indicated by **1 or more** of the following(52)(53)(54)(55)(56):N
        - Complex diabetic ulcer or wound (eg, Wagner or University of Texas classification grade 2 wound)[C](21)
        - Postamputation diabetic wound
        - Superficial ulcer or wound (eg, Wagner or University of Texas classification grade 1 diabetic wound)[C] that has not responded to 4 weeks of conventional treatment(62)
      - Following skin graft or dermal substitute for acute or chronic wound(8)(63)N

- Open fracture N
- Sternal infection(69)(70) N
  - Conventional wound management ongoing (eg, debridement as indicated)(75)
  - No active bleeding or exposed vasculature in wound(50)
  - No eschar or necrotic tissue(5)(52)
  - No exposed cortical bone, nerves, or organs(50)(76)
  - No uncontrolled soft tissue infection or osteomyelitis(5)(50)
  - Provider documents desired goal of therapy prior to initiation (eg, wound healing or closure, management of infection, avoidance of further surgery).(1)
- Continuation of therapy, as indicated by **ALL** of the following:
  - Provider has documented improvement in wound (eg, change in width, depth, length of wound; presence of granulation tissue).
  - Provider has re-evaluated wound within prior 4 weeks.

Alternatives

- Alternatives include:
  - For arterial ulcers: revascularization procedures(77)(78)
  - For diabetic ulcers: topical wound treatment (eg, alginate dressings, foam dressings), hyperbaric oxygen therapy, pressure-relieving and offloading devices, or tissue-engineered skin substitutes. See Hyperbaric Oxygen AC, Pressure-Relieving and Offloading Devices (Total Contact Cast and Removable Cast Walker) AC, and Skin Substitute, Tissue-Engineered (Human Cellular), for Diabetic Foot Ulcer and Venous Ulcer AC for further information.(61)(79)
  - For wounds on weight-bearing surface: pressure-relieving and offloading devices. See Pressure-Relieving and Offloading Devices (Total Contact Cast and Removable Cast Walker) AC for further information.(80)(81)(82)(83)(84)
  - For wounds with active infection: treatment directed at decreasing signs and symptoms of infection(81)(85)(86)(87)
  - For wounds with eschar or other necrotic tissue: surgical, autolytic, biological, or enzymatic debridement(88)(89)
  - Self-care and education
  - Standard wound care with dressings that maintain a moist wound bed(1)(79)(82)(90)

Evidence Summary

Background

Negative pressure wound therapy (vacuum-assisted wound closure) uses a specialized dressing and vacuum drainage to remove blood or serous fluid from a wound or operation site while maintaining a moist wound environment.(3)(4)(5) **(EG 2)** A piece of foam with an open-cell structure is introduced into the wound, and a wound drain with lateral perforations is placed on top of it. To create a vacuum seal, the entire area is covered with a transparent adhesive membrane that is firmly secured to the healthy skin around the wound margin.(6)(7)(8)(9) **(EG 2)** When the exposed end of the drain tube is connected to a vacuum source, fluid is drawn from the wound through the foam into a reservoir, for subsequent disposal.(4)(6)(10) **(EG 2)** Cycles of automated instillation of topical wound solution (eg, saline or topical antiseptic solution), which remains in contact with the wound for a period of time followed by removal using negative pressure, is known as negative pressure wound therapy with instillation and dwell time; its rationale is to facilitate the cleansing of bacterial and particulate matter from the wound.(9)(11) **(EG 2)** Negative pressure wound therapy may be delivered using mechanically powered or electrically powered devices.(12) **(EG 2)**

Criteria

The evidence for the clinical indications found in this guideline includes 64 published peer reviewed articles, 3 specialty society or other evidence-based guidelines, and 7 Cochrane systematic reviews.

For diabetic ulcers or wounds, evidence demonstrates at least moderate certainty of at least moderate net benefit. **(RG A1)** A meta-analysis of 3 studies (90 patients with diabetic foot ulcers) found that negative pressure wound therapy was associated with a decrease in wound surface area as compared with conventional wet gauze application.(57) **(EG 1)** A systematic review of 7 studies (489 patients) evaluating the efficacy of negative pressure wound therapy for diabetic foot ulcers found that use of negative pressure wound therapy was associated with a reduction in amputations, a reduction in wound area and depth, and a greater rate of granulation tissue formation. However, the authors noted that many of the studies included were limited by small sample sizes and methodological flaws, including a lack of validated tools to measure wound area and depth and the different types of pressures used for the negative pressure wound therapy devices.(58) **(EG 1)** A systematic review of 11 randomized controlled trials (972 patients) evaluating negative pressure wound therapy for foot wounds in people with diabetes found that negative pressure wound therapy may increase the proportion of wounds healed and reduce the time to healing for postoperative foot wounds and ulcers as compared with wound dressings. The authors note that the review is based on low-certainty evidence from studies with potential bias and heterogeneous sample sizes.(59) **(EG 1)** A health technology assessment concluded that diabetic foot wounds treated with negative pressure wound therapy may be more likely to heal and also may heal more rapidly, as compared with those treated with advanced moist wound therapy.(1) **(EG 1)** An international expert panel recommends negative pressure wound therapy for wounds associated with diabetic lower limb disease to prevent amputation or reamputation.(52) **(EG 2)** A clinical practice guideline endorsed by multiple specialty societies recommends negative pressure wound therapy for treatment of diabetic foot ulcers that fail to demonstrate greater than 50% wound area reduction after 4 weeks of standard wound therapy; it can also be considered for chronic diabetic foot wounds that do not improve after 4 to 8 weeks of treatment with dressings.(60) **(EG 2)** A specialty society guideline recommends negative pressure wound therapy to increase the proportion and rate of healing of diabetic lower extremity wounds.(55) **(EG 2)**

For use following skin grafts or dermal substitutes for an acute or chronic wound, evidence demonstrates a net benefit, but of less than moderate certainty, and may consist of a consensus opinion of experts, case studies, and common standard care. **(RG A2)** A systematic review and meta-analysis of 12 studies (7 randomized controlled trials, 653 patients) comparing negative pressure wound therapy with conventional therapy after split-thickness skin graft found that negative pressure wound therapy significantly increased the rate of graft take and reduced the reoperation rate. The authors identified the paucity of high-quality randomized trials as a limitation of the study.(64) **(EG 1)** A prospective cohort study of 47 patients with skin defects evaluated the effectiveness of the addition of negative pressure wound dressing over simultaneous allografting and skin grafting. The authors concluded that graft take was significantly higher and the mean time to healing shorter in the negative pressure wound therapy group as compared with the control group.(65) **(EG 2)** A prospective randomized controlled trial that studied 40 split-skin grafts on 30 burn patients found that negative pressure dressing significantly improved graft take as compared with a conventional dressing of Vaseline gauze and cotton pads.(8) **(EG 1)** Based on a systematic review, an international expert panel recommends the use of negative pressure wound therapy to improve graft success or in wounds at high risk for graft loss (eg, arterial insufficiency).(66) **(EG 1)**

For open fractures, evidence demonstrates a net benefit, but of less than moderate certainty, and may consist of a consensus opinion of experts, case studies, and common standard care. **(RG A2)** A meta-analysis of 4 randomized controlled trials of 367 patients with open wounds after fracture repair found that vacuum-assisted wound closure reduced infection rates by 53% as compared with nonvacuum closure.(67) **(EG 1)** A meta-analysis comparing negative pressure wound therapy with standard treatment for open fracture wounds identified 4 randomized controlled trials with a total of 596 patients. No difference was observed in risk of wound infection in patients treated with negative pressure wound therapy vs standard treatment; one randomized controlled trial (460 patients) also evaluated complete wound healing at 6 weeks' follow-up and found no difference between treatment arms.(68) **(EG 1)** Based on a systematic review, an international expert panel recommends the use of negative pressure wound therapy as a bridge to definitive closure when primary closure is not possible after or between debridements.(66) **(EG 1)**

For sternal infection, evidence demonstrates at least moderate certainty of at least moderate net benefit. **(RG A1)** A systematic review of 12 cohort studies (873 patients) found that vacuum-assisted closure therapy, as compared with conventional therapy, was associated with significantly reduced hospital length of stay and increased wound closure, but no difference in mortality, as compared with standard care.(69) **(EG 2)** A retrospective review of 157 patients with poststernotomy mediastinitis found that negative pressure wound therapy, as compared with conventional therapy, was associated with a significantly lower reinfection rate, a significantly lower hospital length of stay, and a nonsignificantly lower early mortality rate.(71) **(EG 2)** A retrospective analysis of 113 patients with poststernotomy mediastinitis found that vacuum-assisted closure, when compared with open packing, was associated with both significantly lower in-hospital mortality and significantly lower intensive care unit stay.(72) **(EG 2)** A systematic review and meta-analysis of 36 retrospective studies (3681 patients with deep sternal wound infections) found that negative pressure wound therapy was associated with reduced mortality and fewer reinfections as compared with conventional wound

management following cardiothoracic surgery.(73) **(EG 1)** A review article describes the use of vacuum-assisted closure after wound exploration for deep sternal wound infection; the duration of therapy is not well defined, but there are some recommendations for short-term (less than 3 weeks) use of vacuum-assisted closure followed by sternal closure.(74) **(EG 2)**

Inconclusive or Non-Supportive Evidence

For abdominal wounds (superficial wound without organ space involvement), evidence is insufficient, conflicting, or poor and demonstrates an incomplete assessment of net benefit vs harm; additional research is recommended. **(RG B)** A literature review of negative pressure wound therapy for treatment of infected laparotomy wounds found 4 low-quality studies that demonstrated faster wound healing, decreased hospital length of stay, and fewer dressing changes; however, the authors concluded that higher-quality studies are needed before definitive recommendations can be made.(13) **(EG 2)** A single-blind randomized controlled trial of 507 adults with spontaneous wound dehiscence after abdominal surgery or open postoperative abdominal wounds that could not be closed by primary intention evaluated negative pressure wound therapy compared with conventional wound treatment and found that the mean times to wound closure were 36.1 days and 39.1 days in the negative pressure wound therapy and conventional wound treatment groups, respectively; however, the risk for wound-related adverse events was higher in the negative pressure wound therapy group. The authors noted that the single-blind study design as well as the short treatment and observation times may have limited the results of the study.(14) **(EG 1)** A retrospective study of 130 patients with infected laparotomy incisions reported shorter times to complete healing, shorter hospital stays, and lower reinfection rates in wounds treated with vacuum-assisted closure as compared with conventional management (saline dressings and secondary suturing). The study authors concluded that, while these findings appear to be promising, additional studies (including randomized controlled trials) are needed to define the role of negative pressure wound therapy in the management of postoperative wounds.(15) **(EG 2)** Other studies of negative pressure wound therapy for superficial abdominal wounds are retrospective in nature, include small numbers of patients, or are confounded by variables such as the surgical approach (eg, open vs laparoscopic), which limit their generalizability.(16)(17)(18)(19) **(EG 2)**

For lower extremity infected bypass grafts, evidence is insufficient, conflicting, or poor and demonstrates an incomplete assessment of net benefit vs harm; additional research is recommended. **(RG B)** Experience with negative pressure wound therapy for infected bypass grafts of the lower extremities is limited. A retrospective study of 37 patients with 45 infected bypass grafts, including 28 synthetic grafts, reported a graft preservation rate of 76%, a major amputation rate of 33%, and a mortality rate of 55% after a median follow-up of 15 months; some patients also underwent adjunctive sartorius muscle flap transposition procedures. The study authors indicated that consideration may be given to conducting a prospective multicenter study comparing vacuum-assisted wound closure with radical surgery.(20) **(EG 2)**

For necrotizing fasciitis, evidence is insufficient, conflicting, or poor and demonstrates an incomplete assessment of net benefit vs harm; additional research is recommended. **(RG B)** A health technology assessment and a systematic review concluded that there is insufficient evidence to support negative pressure wound therapy for this indication and that more research is needed.(1)(21) **(EG 1)** A retrospective cohort study of 92 patients with localized or disseminated Fournier gangrene who received either vacuum-assisted closure therapy or conventional dressings following surgery found, at 10 weeks post debridement, that use of vacuum-assisted closure was associated with increased rates of wound closure among patients with disseminated disease, with no difference seen among patients with localized disease; vacuum-assisted closure therapy was associated with prolonged length of stay for all patients and time to wound closure in patients with localized disease as compared with conventional dressings.(22) **(EG 2)**

For open abdominal wound, and need for temporary abdominal closure, evidence is insufficient, conflicting, or poor and demonstrates an incomplete assessment of net benefit vs harm; additional research is recommended. **(RG B)** A systematic review including 2 studies (74 adults with open abdominal wounds) found insufficient evidence to determine whether negative pressure wound therapy improved primary fascial closure of the abdomen, reduced adverse events, or decreased all-cause mortality as compared with other temporary abdominal closure techniques. The authors recommended future research evaluating these outcomes as well as investigating health-related quality of life, wound infection, and pain outcomes.(23) **(EG 1)** A systematic review and meta-analysis of 8 studies (1225 patients) evaluating techniques for temporary abdominal closure of open abdominal wounds found, through subgroup analysis, that negative pressure wound therapy was not associated with any improvement in the rates of primary fascial closure, postoperative 30-day overall morbidity, postoperative fistula, postoperative bleeding, and postoperative abdominal abscess compared with non-negative pressure wound therapy techniques. However, negative pressure wound therapy was associated with a lower postoperative mortality rate and length of stay. The authors stated that the findings were limited by the lack of high-quality randomized

controlled trials and publication bias and recommended further prospective randomized studies with homogeneous inclusion criteria.(24) **(EG 1)** A systematic review of 2 randomized trials and 9 cohort studies comparing the efficacy and safety of negative pressure wound therapy with alternative temporary abdominal closure techniques in critically ill adults with open abdominal wounds concluded that, while limited prospective data suggest that negative pressure wound therapy may be associated with improved outcomes, the clinical heterogeneity and quality of available studies preclude definitive conclusions regarding its use.(25) **(EG 1)** The Open Abdomen Advisory Panel concluded that there were no randomized controlled studies to support negative pressure as initial treatment; there was one inconclusive study to support its use in open abdomen closure; and for progressive closure, results were the same for synthetic materials and negative pressure wound therapy.(26) **(EG 2)** A prospective multicenter observational study of 578 patients with open abdominal wounds reported that negative pressure wound therapy was not associated with an increase in intestinal fistula formation or mortality as compared with other wound management techniques (eg, Bogota bag, mesh); however, a significantly lower rate of delayed closure was observed with negative pressure therapy.(27) **(EG 2)** An interventional procedure guidance report cites adequate evidence to support negative pressure wound therapy for the open abdomen under select clinical circumstances with audit and clinical governance. The advisory committee recommended additional research, citing a lack of evidence for outcomes such as impact on wound care, healing rates, and duration of hospital stay.(28) **(EG 2)**

For partial-thickness burns, evidence is insufficient, conflicting, or poor and demonstrates an incomplete assessment of net benefit vs harm; additional research is recommended. **(RG B)** A systematic review concluded that there is insufficient evidence to determine the effectiveness of negative pressure wound therapy for this indication.(29) **(EG 1)**

For pressure injuries, evidence is insufficient, conflicting, or poor and demonstrates an incomplete assessment of net benefit vs harm; additional research is recommended. **(RG B)** Systematic reviews have concluded that the effect of negative pressure wound therapy for treatment of pressure ulcers is unknown due to weak methodology in published randomized controlled trials.(30)(31) **(EG 1)** A health technology assessment concluded that there was a lack of good-quality trials for negative pressure wound therapy for the treatment of pressure ulcers.(1) **(EG 1)** A specialty society guideline based in part on a systematic review concluded that negative pressure wound therapy is similar in efficacy to standard care for reducing wound size.(31)(32) **(EG 2)** A practice guideline suggests the use of negative pressure wound therapy for stage III or IV pressure ulcers that fail to progressively heal with conventional therapy, despite the lack of high-quality evidence supporting this intervention.(33) **(EG 2)** A review article states that negative pressure wound therapy may be considered for early stage 3 or 4 pressure injuries but acknowledges that the recommendation is based on limited data.(34) **(EG 2)**

For surgical site infection prevention, evidence is insufficient, conflicting, or poor and demonstrates an incomplete assessment of net benefit vs harm; additional research is recommended. **(RG B)** For cesarean birth, a systematic review and meta-analysis of 9 randomized controlled trials (5529 obese patients) comparing negative pressure wound therapy (NPWT) with standard dressings for the management of wound complications after cesarean birth found that NPWT was associated with a reduction in postoperative infections and an increase in blistering compared with standard dressings. However, the authors noted that lack of blinding and heterogeneity among included studies in follow-up periods, definition of standard dressings, definition of surgical site infection, and operative antiseptic techniques limited the results.(35) **(EG 1)** For closed laparotomy, a systematic review and meta-analysis of 9 studies (1266 patients) evaluating the use of NPWT found that NPWT was associated with a lower rate of surgical site infections compared with standard dressings (12.4% and 27.1% in the negative pressure and standard therapy groups, respectively). However, the analysis was limited by the different NPWT devices that were utilized in different trials as well as the heterogeneity of the included trials, which included nonrandomized trials.(36) **(EG 1)** A systematic review and meta-analysis of 12 studies with 1355 patients (one randomized controlled trial) comparing prophylactic NPWT with standard dressings on closed laparotomy incisions following ventral hernia repair found that NPWT was associated with a decreased risk of surgical site infection compared with standard dressings. However, the authors noted that the lack of randomized trials and heterogeneity among included studies in follow-up periods and definitions of surgical site infections limited the results, and further randomized trials were recommended.(37) **(EG 1)** For general abdominal surgery, a meta-analysis of 20 studies with 3193 patients (6 randomized controlled trials) evaluating prophylactic NPWT after general abdominal surgery found that NPWT was associated with a lower rate of surgical site infection compared with standard dressings in pooled data from all 20 studies; however, when data were pooled solely from the 6 randomized controlled trials, no difference in surgical site infection was seen between NPWT and standard dressings. The authors noted that significant clinical and methodological heterogeneity among studies limited the results, and further randomized controlled trials were recommended.(38) **(EG 1)** For groin surgery for vascular access, a systematic review and meta-analysis evaluating interventions to prevent groin wound surgical site infections after vascular surgery included 11 studies with 1344 patients (8 randomized trials) comparing NPWT with standard wound care and found that NPWT was associated with fewer surgical site infections compared with standard care. However, heterogeneity among studies in

surgical techniques, surgical populations, and operative antiseptic techniques limited the results, and further randomized trials were recommended.(39) **(EG 1)** A systematic review and meta-analysis of 62 studies (44 studies with 11,403 patients included in meta-analysis) comparing the incidence of surgical site infection in wounds treated with either NPWT or standard surgical dressings found that NPWT probably results in fewer surgical site infections compared with standard dressings (8.7% vs 11.75%, respectively); however, the authors noted that these findings are based on moderate-certainty evidence due to a high risk of bias in the included studies.(40) **(EG 1)** A systematic review of 6 randomized controlled trials and 15 observational studies (5122 patients) found low-quality evidence that prophylactic NPWT was associated with a lower risk of developing surgical site infection compared with conventional dressings; this association was not seen in orthopedic or trauma surgery, and the results were conflicting for vascular surgery. The authors recommended additional randomized controlled trials be performed to determine the role of prophylactic NPWT.(41) **(EG 1)** A practice guideline suggests the use of NPWT in adult patients with closed surgical incisions in high-risk wounds (eg, bleeding/hematoma, dead space, decreased blood flow, intraoperative contamination, poor tissue perfusion due to surrounding tissue damage) to prevent surgical site infections based on low-quality evidence.(42) **(EG 2)** For lower limb arthroplasty or fracture repair, a systematic review and meta-analysis of 7 randomized controlled trials (1053 patients) evaluating the efficacy of closed-incision NPWT for prevention of surgical site infection after total hip or total knee arthroplasty found that NPWT was associated with reduced surgical site infection compared with standard wound therapy among patients undergoing joint revision surgery; among patients undergoing primary arthroplasty, no difference in surgical site infection was seen between NPWT and standard wound therapy. The authors noted that lack of blinding, small numbers of primary arthroplasties, and heterogeneity among included studies limited the results.(43) **(EG 1)** A multicenter randomized trial enrolled 122 patients who were considered to be at high risk for wound infection after direct anterior total hip arthroplasty and found that prophylactic closed-incision NPWT was associated with lower rates of superficial surgical site infections as compared with application of an occlusive dressing. The authors advised future trials powered to evaluate rates of more severe surgical site complications.(44) **(EG 1)** A literature review of NPWT for the prevention of surgical site infection in hip and knee arthroplasties indicated that there may be a benefit in high-risk patients, but the authors concluded that larger prospective studies are needed to more definitively establish the role of this treatment in hip and knee reconstructive surgery.(9) **(EG 2)** A randomized prospective trial of 1540 participants age 16 years or older who underwent surgery for a lower limb fracture (81% with closed fractures) due to major trauma compared incisional NPWT with standard wound dressings and found, at 30 days and 90 days postoperatively, no difference between groups in the primary outcome of deep surgical site infections.(45)(46) **(EG 1)** For stoma reversal surgery, a single-center open-label randomized trial of 100 patients undergoing stoma reversal surgery compared prophylactic NPWT with conventional dressings and found, at 30-day follow-up, no difference in surgical site infections or wound complications between groups.(47) **(EG 1)**

For venous leg ulcers, evidence is insufficient, conflicting, or poor and demonstrates an incomplete assessment of net benefit vs harm; additional research is recommended. **(RG B)** Experience with negative pressure wound therapy for venous leg ulcers is limited.(48) **(EG 2)** A systematic review found no evidence from randomized controlled trials to support using negative pressure wound therapy as primary treatment for leg ulcers.(49) **(EG 1)** Primary treatment (without skin grafting) of venous leg ulcers with negative pressure wound therapy is not recommended.(2) **(EG 2)**

Rationale

Use of this MCG care guideline helps the clinician determine if a particular treatment, medication, or service might be appropriate for a specific patient, taking into account their unique health complexities.

Use of these evidence-based clinical criteria to support decision making benefits the patient by identifying patient-specific complex clinical factors and conditions, promoting personalized treatment. Utilizing evidence-based clinical criteria promotes patient safety by helping ensure that potential patient benefits outweigh the risks. In addition, the use of evidence-based guidelines can increase consistency in treatment thresholds, leading to less variation in care and promoting equitable treatment among patients.

Related CMS Coverage Guidance

This guideline supplements but does not replace, modify, or supersede existing Medicare regulations or applicable National Coverage Determinations (NCDs) or Local Coverage Determinations (LCDs).

Code of Federal Regulations (CFR): 42 CFR 419.22(91); 42 CFR 422.101(92)

Internet-Only Manual (IOM) Citations: CMS IOM Publication 100-02, Medicare Benefit Policy Manual, Chapter 14 - Medical Devices(93); CMS IOM Publication 100-02, Medicare Benefit Policy Manual, Chapter 15 - Covered Medical and Other Health Services(94); CMS IOM Publication 100-02, Medicare Benefit Policy Manual, Chapter 16 - General Exclusions from Coverage(95)

Medicare Coverage Determinations: Medicare Coverage Database(96)

References

1. Negative Pressure Wound Therapy (NPWT). [Internet] Healthcare Improvement Scotland. 2019 Jan Accessed at: https://www.healthcareimprovementscotland.org/. [accessed 2025 Sep 12] [Context Link 1, 2, 3, 4, 5, 6]
2. Desai KK, Hahn E, Pulikkottil B, Pulikkotill B, Lee E. Negative pressure wound therapy: an algorithm. Clinics in Plastic Surgery 2012;39(3):311-324. DOI: 10.1016/j.cps.2012.05.002. [Context Link 1, 2] View abstract...
3. Isaac AL, Armstrong DG. Negative pressure wound therapy and other new therapies for diabetic foot ulceration: the current state of play. Medical Clinics of North America 2013;97(5):899-909. DOI: 10.1016/j.mcna.2013.03.015. [Context Link 1, 2] View abstract...
4. Keenan C, Obaidi N, Neelon J, Yau I, Carlsson AH, Nuutila K. Negative pressure wound therapy: challenges, novel techniques, and future perspectives. Advances in Wound Care 2025;14(1):33-47. DOI: 10.1089/wound.2023.0157. [Context Link 1, 2] View abstract...
5. Poteet SJ, Schulz SA, Povoski SP, Chao AH. Negative pressure wound therapy: device design, indications, and the evidence supporting its use. Expert Review of Medical Devices 2021;18(2):151-160. DOI: 10.1080/17434440.2021.1882301. [Context Link 1, 2, 3] View abstract...
6. Peinemann F, Sauerland S. Negative-pressure wound therapy: systematic review of randomized controlled trials. Deutsches Arzteblatt International 2011;108(22):381-9. DOI: 10.3238/arztebl.2011.0381. [Context Link 1, 2] View abstract...
7. Suissa D, Danino A, Nikolis A. Negative-pressure therapy versus standard wound care: a meta-analysis of randomized trials. Plastic and Reconstructive Surgery 2011;128(5):498e-503e. DOI: 10.1097/PRS.0b013e31822b675c. [Context Link 1] View abstract...
8. Petkar KS, et al. A prospective randomized controlled trial comparing negative pressure dressing and conventional dressing methods on split-thickness skin grafts in burned patients. Burns 2011;37(6):925-9. DOI: 10.1016/j.burns.2011.05.013. [Context Link 1, 2, 3] View abstract...
9. Siqueira MB, Ramanathan D, Klika AK, Higuera CA, Barsoum WK. Role of negative pressure wound therapy in total hip and knee arthroplasty. World Journal of Orthopedics 2016;7(1):30-7. DOI: 10.5312/wjo.v7.i1.30. [Context Link 1, 2, 3] View abstract...
10. Schintler MV. Negative pressure therapy: theory and practice. Diabetes/Metabolism Research and Reviews 2012;28 Suppl 1:72-7. DOI: 10.1002/dmrr.2243. [Context Link 1] View abstract...
11. Faust E, Opoku-Agyeman JL, Behnam AB. Use of negative-pressure wound therapy with instillation and dwell time: an overview. Plastic and Reconstructive Surgery 2021;147(1S-1):16S-26S. DOI: 10.1097/PRS.0000000000007607. [Context Link 1] View abstract...
12. Armstrong DG, Marston WA, Reyzelman AM, Kirsner RS. Comparative effectiveness of mechanically and electrically powered negative pressure wound therapy devices: a multicenter randomized controlled trial. Wound Repair and Regeneration 2012;20(3):332-41. DOI: 10.1111/j.1524-475X.2012.00780.x. [Context Link 1] View abstract...
13. Tan A, Gollop ND, Klimach SG, Maruthappu M, Smith SF. Should infected laparotomy wounds be treated with negative pressure wound therapy? International Journal of Surgery 2014;12(5):26-9. DOI: 10.1016/j.ijsu.2013.11.002. [Context Link 1] View abstract...
14. Seidel D, et al. Negative pressure wound therapy vs conventional wound treatment in subcutaneous abdominal wound healing impairment: the SAWHI randomized clinical trial. JAMA Surgery 2020;155(6):469-478. DOI: 10.1001/jamasurg.2020.0414. [Context Link 1] View abstract...
15. Zhen ZJ, Lai EC, Lee QH, Chen HW, Lau WY, Wang FJ. Conventional wound management versus a closed suction irrigation method for infected laparotomy wound--a comparative study. International Journal of Surgery 2011;9(5):378-81. DOI: 10.1016/j.ijsu.2011.02.012. [Context Link 1] View abstract...
16. Baharestani MM, Gabriel A. Use of negative pressure wound therapy in the management of infected abdominal wounds containing mesh: an analysis of outcomes. International Wound Journal 2011;8(2):118-25. DOI: 10.1111/j.1742-481X.2010.00756.x. [Context Link 1] View abstract...

17. Brown M, Adenuga P, Soltanian H. Massive panniculectomy in the super obese and super-super obese: retrospective comparison of primary closure versus partial open wound management. Plastic and Reconstructive Surgery 2014;133(1):32-9. DOI: 10.1097/01.prs.0000436818.34332.34. [Context Link 1] View abstract...
18. Dobson MW, Geisler D, Fazio V, Remzi F, Hull T, Vogel J. Minimally invasive surgical wound infections: laparoscopic surgery decreases morbidity of surgical site infections and decreases the cost of wound care. Colorectal Disease 2011;13(7):811-5. DOI: 10.1111/j.1463-1318.2010.02302.x. [Context Link 1] View abstract...
19. Gassman A, et al. Positive outcomes with negative pressure therapy over primarily closed large abdominal wall reconstruction reduces surgical site infection rates. Hernia 2015;19(2):273-8. DOI: 10.1007/s10029-014-1312-y. [Context Link 1] View abstract...
20. Acosta S, Monsen C. Outcome after VAC therapy for infected bypass grafts in the lower limb. European Journal of Vascular and Endovascular Surgery 2012;44(3):294-9. DOI: 10.1016/j.ejvs.2012.06.005. [Context Link 1] View abstract...
21. Xie X, McGregor M, Dendukuri N. The clinical effectiveness of negative pressure wound therapy: a systematic review. Journal of Wound Care 2010;19(11):490-5. [Context Link 1, 2] View abstract...
22. Iacovelli V, et al. The role of vacuum-assisted closure (VAC) therapy in the management of FOURNIER'S gangrene: a retrospective multi-institutional cohort study. World Journal of Urology 2021;39(1):121-128. DOI: 10.1007/s00345-020-03170-7. [Context Link 1] View abstract...
23. Cheng Y, et al. Negative pressure wound therapy for managing the open abdomen in non-trauma patients. Cochrane Database of Systematic Reviews 2022, Issue 5. Art. No.: CD013710. DOI: 10.1002/14651858.CD013710.pub2. [Context Link 1] View abstract...
24. Cirocchi R, et al. What is the effectiveness of the negative pressure wound therapy (NPWT) in patients treated with open abdomen technique? A systematic review and meta-analysis. Journal of Trauma and Acute Care Surgery 2016;81(3):575-84. DOI: 10.1097/TA.0000000000001126. [Context Link 1] View abstract...
25. Roberts DJ, et al. Negative-pressure wound therapy for critically ill adults with open abdominal wounds: a systematic review. Journal of Trauma and Acute Care Surgery 2012;73(3):629-39. DOI: 10.1097/TA.0b013e31825c130e. [Context Link 1] View abstract...
26. Management of the open abdomen: from initial operation to definitive closure. American Surgeon 2009;75(11 Suppl):S1-22. [Context Link 1] View abstract...
27. Carlson GL, et al. Management of the open abdomen: a national study of clinical outcome and safety of negative pressure wound therapy. Annals of Surgery 2013;257(6):1154-9. DOI: 10.1097/SLA.0b013e31828b8bc8. [Context Link 1] View abstract...
28. Negative Pressure Wound Therapy for the Open Abdomen. NICE Interventional Procedure Guidance IPG467 [Internet] National Institute for Health and Care Excellence. 2013 Nov Accessed at: https://www.nice.org.uk/guidance/. [accessed 2024 Sep 27] [Context Link 1]
29. Dumville JC, Munson C, Christie J. Negative pressure wound therapy for partial-thickness burns. Cochrane Database of Systematic Reviews 2014, Issue 12. Art. No.: CD006215. DOI: 10.1002/14651858.CD006215.pub4. [Context Link 1] View abstract...
30. Shi J, et al. Negative pressure wound therapy for treating pressure ulcers. Cochrane Database of Systematic Reviews 2023, Issue 5. Art. No.: CD011334. DOI: 10.1002/14651858.CD011334.pub3. [Context Link 1] View abstract...
31. Smith ME, et al. Pressure ulcer treatment strategies: a systematic comparative effectiveness review. Annals of Internal Medicine 2013;159(1):39-50. DOI: 10.7326/0003-4819-159-1-201307020-00007. [Context Link 1, 2] View abstract...
32. Qaseem A, Humphrey LL, Forciea MA, Starkey M, Denberg TD, Clinical Guidelines Committee of the American College of Physicians. Treatment of pressure ulcers: a clinical practice guideline from the American College of Physicians. Annals of Internal Medicine 2015;162(5):370-379. DOI: 10.7326/M14-1568. (Reaffirmed 2025 Jun) [Context Link 1] View abstract...
33. Gould LJ, et al. WHS guidelines for the treatment of pressure ulcers-2023 update. Wound Repair and Regeneration 2024;32(1):6-33. DOI: 10.1111/wrr.13130. [Context Link 1] View abstract...
34. Visconti AJ, Sola OI, Raghavan PV. Pressure injuries: prevention, evaluation, and management. American Family Physician 2023;108(2):166-174. [Context Link 1] View abstract...
35. Gillespie BM, et al. Effect of negative-pressure wound therapy on wound complications in obese women after caesarean birth: a systematic review and meta-analysis. BJOG: An International Journal of Obstetrics and Gynaecology 2022;129(2):196-207. DOI: 10.1111/1471-0528.16963. [Context Link 1] View abstract...
36. Sahebally SM, et al. Negative pressure wound therapy for closed laparotomy incisions in general and colorectal surgery: a systematic review and meta-analysis. JAMA Surgery 2018;153(11):e183467. DOI: 10.1001/jamasurg.2018.3467. [Context Link 1] View abstract...

37. Guo C, Cheng T, Li J. Prophylactic negative pressure wound therapy for closed laparotomy incisions after ventral hernia repair: A systematic review and meta-analysis. International Journal of Surgery 2022;97:Online. DOI: 10.1016/j.ijsu.2021.106216. [Context Link 1] View abstract...
38. Almansa-Saura S, et al. Prophylactic use of negative pressure therapy in general abdominal surgery: a systematic review and meta-analysis. Surgical Infections 2021;22(8):854-863. DOI: 10.1089/sur.2020.407. [Context Link 1] View abstract...
39. Gwilym BL, et al. Editor's Choice - systematic review and meta-analysis of wound adjuncts for the prevention of groin wound surgical site Infection in arterial surgery. European Journal of Vascular and Endovascular Surgery 2021;61(4):636-646. DOI: 10.1016/j.ejvs.2020.11.053. [Context Link 1] View abstract...
40. Norman G, et al. Negative pressure wound therapy for surgical wounds healing by primary closure. Cochrane Database of Systematic Reviews 2022, Issue 4. Art. No.: CD009261. DOI: 10.1002/14651858.CD009261.pub7. [Context Link 1] View abstract...
41. De Vries FE, et al. A systematic review and meta-analysis including GRADE qualification of the risk of surgical site infections after prophylactic negative pressure wound therapy compared with conventional dressings in clean and contaminated surgery. Medicine 2016;95(36):e4673. DOI: 10.1097/MD.0000000000004673. [Context Link 1] View abstract...
42. Global Guidelines for the Prevention of Surgical Site Infection. [Internet] World Health Organization. 2nd ed; 2018 Jan Accessed at: https://www.who.int/publications/guidelines/year/en/. [created 2016; accessed 2025 Sep 17] [Context Link 1] View abstract...
43. Ailaney N, Johns WL, Golladay GJ, Strong B, Kalore NV. Closed Incision Negative Pressure Wound Therapy for Elective Hip and Knee Arthroplasty: A Systematic Review and Meta-Analysis of Randomized Controlled Trials. Journal of Arthroplasty 2021;36(7):2402-2411. DOI: 10.1016/j.arth.2020.11.039. [Context Link 1] View abstract...
44. Cooper HJ, et al. Randomized controlled trial of incisional negative pressure following high-risk direct anterior total hip arthroplasty. Journal of Arthroplasty 2022;37(8S):S931-S936. DOI: 10.1016/j.arth.2022.03.039. [Context Link 1] View abstract...
45. Costa ML, et al. Effect of incisional negative pressure wound therapy vs standard wound dressing on deep surgical site infection after surgery for lower limb fractures associated with major trauma: the WHIST randomized clinical trial. Journal of the American Medical Association 2020;323(6):519-526. DOI: 10.1001/jama.2020.0059. [Context Link 1] View abstract...
46. Costa ML, et al. Negative-pressure wound therapy compared with standard dressings following surgical treatment of major trauma to the lower limb: the WHiST RCT. Health Technology Assessment 2020;24(38):1-86. DOI: 10.3310/hta24380. [Context Link 1] View abstract...
47. Carrano FM, et al. Negative-pressure wound therapy after stoma reversal in colorectal surgery: a randomized controlled trial. BJS Open 2021;5(6):Online. DOI: 10.1093/bjsopen/zrab116. [Context Link 1] View abstract...
48. Richmond NA, Maderal AD, Vivas AC. Evidence-based management of common chronic lower extremity ulcers. Dermatologic Therapy 2013;26(3):187-96. DOI: 10.1111/dth.12051. [Context Link 1] View abstract...
49. Dumville JC, Land L, Evans D, Peinemann F. Negative pressure wound therapy for treating leg ulcers. Cochrane Database of Systematic Reviews 2015, (verified by Cochrane 2016 Dec), Issue 7. Art. No.: CD011354. DOI: 10.1002/14651858.CD011354.pub2. [Context Link 1] View abstract...
50. Huang C, Leavitt T, Bayer LR, Orgill DP. Effect of negative pressure wound therapy on wound healing. Current Problems in Surgery 2014;51(7):301-31. DOI: 10.1067/j.cpsurg.2014.04.001. [Context Link 1, 2, 3, 4] View abstract...
51. Phillips MR, English SL, Reichard K, Vinocur C, Berman L. The safety and efficacy of using negative pressure incisional wound VACs in pediatric and neonatal patients. Journal of Pediatric Surgery 2020;55(8):1470-1474. DOI: 10.1016/j.jpedsurg.2019.10.011. [Context Link 1] View abstract...
52. Vig S, et al. Evidence-based recommendations for the use of negative pressure wound therapy in chronic wounds: steps towards an international consensus. Journal of Tissue Viability 2011;20 Suppl 1:S1-18. DOI: 10.1016/j.jtv.2011.07.002. [Context Link 1, 2, 3] View abstract...
53. Chadwick P, Haycocks S, Bielby A, Milne J. A dynamic care pathway to coordinate the use of advanced therapy in diabetic foot ulceration. Journal of Wound Care 2009;18(10):433-7. [Context Link 1] View abstract...
54. White R, McIntosh C. A review of the literature on topical therapies for diabetic foot ulcers. Part 2: Advanced treatments. Journal of Wound Care 2009;18(8):335-41. [Context Link 1] View abstract...
55. Lavery LA, et al. WHS (Wound Healing Society) guidelines update: Diabetic foot ulcer treatment guidelines. Wound Repair and Regeneration 2024;32(1):34-46. DOI: 10.1111/wrr.13133. [Context Link 1, 2] View abstract...

56. Armstrong DG, Tan TW, Boulton AJM, Bus SA. Diabetic Foot Ulcers: A Review. Journal of the American Medical Association 2023;330(1):62-75. DOI: 10.1001/jama.2023.10578. [Context Link 1] View abstract...
57. Dalmedico MM, do Rocio Fedalto A, Martins WA, de Carvalho CKL, Fernandes BL, Ioshii SO. Effectiveness of negative pressure wound therapy in treating diabetic foot ulcers: a systematic review and meta-analysis of randomized controlled trials. Wounds 2024;36(8):281-289. DOI: 10.25270/wnds/23140. [Context Link 1] View abstract...
58. Wynn M, Freeman S. The efficacy of negative pressure wound therapy for diabetic foot ulcers: A systematised review. Journal of Tissue Viability 2019;28(3):152-160. DOI: 10.1016/j.jtv.2019.04.001. [Context Link 1] View abstract...
59. Liu Z, et al. Negative pressure wound therapy for treating foot wounds in people with diabetes mellitus. Cochrane Database of Systematic Reviews 2018, Issue 10. Art. No.: CD010318. DOI: 10.1002/14651858.CD010318.pub3. [Context Link 1] View abstract...
60. Hingorani A, et al. The management of diabetic foot: a clinical practice guideline by the Society for Vascular Surgery in collaboration with the American Podiatric Medical Association and the Society for Vascular Medicine. Journal of Vascular Surgery 2016;63(2 Suppl):3S-21S. DOI: 10.1016/j.jvs.2015.10.003. (Reaffirmed 2025 Jun) [Context Link 1] View abstract...
61. Thomas DR. Clinical management of diabetic ulcers. Clinics in Geriatric Medicine 2013;29(2):433-41. DOI: 10.1016/j.cger.2013.01.007. [Context Link 1, 2] View abstract...
62. Snyder RJ, Hanft JR. Diabetic foot ulcers - effects on quality of life, costs, and mortality and the role of standard wound care and advanced-care therapies in healing: a review. Ostomy Wound Management 2009;55(11):28-38. [Context Link 1] View abstract...
63. Watt AJ, Friedrich JB, Huang JI. Advances in treating skin defects of the hand: skin substitutes and negative-pressure wound therapy. Hand Clinics 2012;28(4):519-28. DOI: 10.1016/j.hcl.2012.08.010. [Context Link 1] View abstract...
64. Yin Y, Zhang R, Li S, Guo J, Hou Z, Zhang Y. Negative-pressure therapy versus conventional therapy on split-thickness skin graft: A systematic review and meta-analysis. International Journal of Surgery 2018;50:43-48. DOI: 10.1016/j.ijsu.2017.12.020. [Context Link 1] View abstract...
65. Kim EK, Hong JP. Efficacy of negative pressure therapy to enhance take of 1-stage allodermis and a split-thickness graft. Annals of Plastic Surgery 2007;58(5):536-40. DOI: 10.1097/01.sap.0000245121.32831.47. [Context Link 1] View abstract...
66. Runkel N, et al. Evidence-based recommendations for the use of Negative Pressure Wound Therapy in traumatic wounds and reconstructive surgery: steps towards an international consensus. Injury 2011;42 Suppl 1:S1-12. DOI: 10.1016/S0020-1383(11)00041-6. [Context Link 1, 2] View abstract...
67. Tansarli GS, Vardakas KZ, Stratoulias C, Peppas G, Kapaskelis A, Falagas ME. Vacuum-assisted closure versus closure without vacuum assistance for preventing surgical site infections and infections of chronic wounds: a meta-analysis of randomized controlled trials. Surgical Infections 2014;15(4):363-7. DOI: 10.1089/sur.2013.028. [Context Link 1] View abstract...
68. Iheozor-Ejiofor Z, Newton K, Dumville JC, Costa ML, Norman G, Bruce J. Negative pressure wound therapy for open traumatic wounds. Cochrane Database of Systematic Reviews 2018, Issue 7. Art. No.: CD012522. DOI: 10.1002/14651858.CD012522.pub2. [Context Link 1] View abstract...
69. Pan A, De Angelis G, Nicastri E, Sganga G, Tacconelli E. Topical negative pressure to treat surgical site infections, with a focus on post-sternotomy infections: a systematic review and meta-analysis. Infection 2013;41(6):1129-35. DOI: 10.1007/s15010-013-0536-6. [Context Link 1, 2] View abstract...
70. Christodoulou N, Wolfe B, Mathes DW, Malgor RD, Kaoutzanis C. Vacuum-assisted closure therapy for the management of deep sternal wound complications: A systematic review and meta-analysis. Journal of Plastic, Reconstructive & Aesthetic Surgery 2024;94:251-260. DOI: 10.1016/j.bjps.2023.09.049. [Context Link 1] View abstract...
71. De Feo M, Della Corte A, Vicchio M, Pirozzi F, Nappi G, Cotrufo M. Is post-sternotomy mediastinitis still devastating after the advent of negative-pressure wound therapy? Texas Heart Institute Journal 2011;38(4):375-80. [Context Link 1] View abstract...
72. Vos RJ, Yilmaz A, Sonker U, Kelder JC, Kloppenburg GT. Vacuum-assisted closure of post-sternotomy mediastinitis as compared to open packing. Interactive Cardiovascular and Thoracic Surgery 2012;14(1):17-21. DOI: 10.1093/icvts/ivr049. [Context Link 1] View abstract...
73. Liu YT, et al. Effectiveness and safety of negative pressure wound therapy in patients with deep sternal wound infection: a systematic review and meta-analysis. International Journal of Surgery 2024;110(12):8107-8125. DOI: 10.1097/JS9.0000000000002138. [Context Link 1] View abstract...
74. Goh SSC. Post-sternotomy mediastinitis in the modern era. Journal of Cardiac Surgery 2017;32(9):556-566. DOI: 10.1111/jocs.13189. [Context Link 1] View abstract...
75. Chadwick P. The use of negative pressure wound therapy in the diabetic foot. British Journal of Nursing 2009 Nov 12-25;18(20):S12, S14, S16, passim. [Context Link 1] View abstract...

76. Streubel PN, Stinner DJ, Obremskey WT. Use of negative-pressure wound therapy in orthopaedic trauma. Journal of the American Academy of Orthopedic Surgeons 2012;20(9):564-74. DOI: 10.5435/JAAOS-20-09-564. [Context Link 1] View abstract...
77. Anderson JL, et al. Management of patients with peripheral artery disease (compilation of 2005 and 2011 ACCF/AHA guideline recommendations): a report of the American College of Cardiology Foundation/American Heart Association Task Force on Practice Guidelines. Circulation 2013;127(13):1425-1443. DOI: 10.1161/CIR.0b013e31828b82aa. (Reaffirmed 2025 Jul) [Context Link 1] View abstract...
78. Ricco JB, et al. The diabetic foot: a review. Journal of Cardiovascular Surgery 2013;54(6):755-62. [Context Link 1] View abstract...
79. Wu L, Norman G, Dumville JC, O'Meara S, Bell-Syer SE. Dressings for treating foot ulcers in people with diabetes: an overview of systematic reviews. Cochrane Database of Systematic Reviews 2015, Issue 7. Art. No.: CD010471. DOI: 10.1002/14651858.CD010471.pub2. [Context Link 1, 2] View abstract...
80. Chen P, et al. IWGDF Guidelines on Interventions to Enhance Healing of Foot Ulcers in People With Diabetes. [Internet] International Working Group on the Diabetic Foot. 2023 Accessed at: https://iwgdfguidelines.org/. [accessed 2025 Sep 12] [Context Link 1]
81. Bus SA, et al. IWGDF Guidelines on the Prevention of Foot Ulcers in Persons With Diabetes. [Internet] International Working Group on the Diabetic Foot. 2023 Accessed at: https://iwgdfguidelines.org/. [accessed 2025 Aug 28] [Context Link 1, 2]
82. Stansby G, Avital L, Jones K, Marsden G, Guideline Development Group. Prevention and management of pressure ulcers in primary and secondary care: summary of NICE guidance. British Medical Journal 2014;348:g2592. [Context Link 1, 2] View abstract...
83. Morona JK, Buckley ES, Jones S, Reddin EA, Merlin TL. Comparison of the clinical effectiveness of different off-loading devices for the treatment of neuropathic foot ulcers in patients with diabetes: a systematic review and meta-analysis. Diabetes/Metabolism Research and Reviews 2013;29(3):183-193. DOI: 10.1002/dmrr.2386. [Context Link 1] View abstract...
84. Armstrong DG, Andros G. Use of negative pressure wound therapy to help facilitate limb preservation. International Wound Journal 2012;9 Suppl 1:1-7. DOI: 10.1111/j.1742-481X.2012.01015.x. [Context Link 1] View abstract...
85. Tecilazich F, Dinh T, Veves A. Treating diabetic ulcers. Expert Opinion on Pharmacotherapy 2011;12(4):593-606. DOI: 10.1517/14656566.2011.530658. [Context Link 1] View abstract...
86. Senneville E, et al. IWGDF/IDSA guidelines on the diagnosis and treatment of diabetes-related foot infections (IWGDF/IDSA 2023). Clinical Infectious Diseases [Internet] 2023 Oct Accessed at: https://www.idsociety.org/practice-guideline/diabetic-foot-infections/. [accessed 2025 Sep 03] DOI: 10.1093/cid/ciad527. [Context Link 1] View abstract...
87. Joseph WS, Lipsky BA. Medical therapy of diabetic foot infections. Journal of Vascular Surgery 2010;52(3 Suppl):67S-71S. DOI: 10.1016/j.jvs.2010.06.010. [Context Link 1] View abstract...
88. Edwards J, Stapley S. Debridement of diabetic foot ulcers. Cochrane Database of Systematic Reviews 2010, (verified by Cochrane 2012 Jan), Issue 1. Art. No.: CD003556. DOI: 10.1002/14651858.CD003556.pub2. [Context Link 1] View abstract...
89. Hoppe IC, Granick MS. Debridement of chronic wounds: a qualitative systematic review of randomized controlled trials. Clinics in Plastic Surgery 2012;39(3):221-8. DOI: 10.1016/j.cps.2012.04.001. [Context Link 1] View abstract...
90. Uccioli L, Izzo V, Meloni M, Vainieri E, Ruotolo V, Giurato L. Non-healing foot ulcers in diabetic patients: general and local interfering conditions and management options with advanced wound dressings. Journal of Wound Care 2015;24(4 Suppl):35-42. DOI: 10.12968/jowc.2015.24.Sup4b.35. [Context Link 1] View abstract...
91. Centers for Medicare and Medicaid Services. "Hospital services excluded from payment under the hospital outpatient prospective payment system." 42 CFR 419.22 Washington, DC 2023 Jul [accessed 2025 Jul 22] Accessed at: https://www.ecfr.gov/. [Context Link 1]
92. Centers for Medicare and Medicaid Services. "Requirements relating to basic benefits." 42 CFR 422.101 Washington, DC 2025 Jun 03 [accessed 2025 Jul 23] Accessed at: https://www.ecfr.gov/. [Context Link 1]
93. Centers for Medicare and Medicaid Services. Medicare Benefit Policy Manual. Chapter 14 - Medical Devices Rev. 198 [Internet] Centers for Medicare and Medicaid Services. 2014 Nov 06 Accessed at: https://www.cms.gov/Regulations-and-Guidance/Guidance/Manuals/. [accessed 2025 Sep 09] [Context Link 1]
94. Centers for Medicare and Medicaid Services. Medicare Benefit Policy Manual. Chapter 15 - Covered Medical and Other Health Services Rev. 13108 [Internet] Centers for Medicare and Medicaid Services. 2025 Apr 11 Accessed at: https://www.cms.gov/manuals/. [accessed 2025 Sep 09] [Context Link 1]

95. Centers for Medicare and Medicaid Services. Medicare Benefit Policy Manual. Chapter 16 - General Exclusions From Coverage Rev. 198 [Internet] Centers for Medicare and Medicaid Services. 2014 Nov 06 Accessed at: https://www.cms.gov/Regulations-and-Guidance/Guidance/Manuals/. [accessed 2025 Sep 09] [Context Link 1]

96. Medicare Coverage Database. [Internet] Centers for Medicare and Medicaid Services. Accessed at: https://www.cms.gov/medicare-coverage-database/search.aspx? Updated 2025 [accessed 2025 Oct 23] [Context Link 1]

Footnotes

[A] Negative pressure wound therapy is contraindicated in unexplored fistulas, untreated osteomyelitis, or when there is a malignancy in the wound.(50) [A in Context Link 1]

[B] Negative pressure wound therapy has been shown to be safe and effective in children.(51) [B in Context Link 1]

[C] The Wagner classification system is the most commonly used scale for grading the severity of diabetic foot ulcers. Grade 1 refers to superficial diabetic ulcers and grade 2 refers to ulcers that have extended to ligament, tendon, joint capsule, or deep fascia. The University of Texas diabetic wound classification system is a similar grading scale: grade 1 refers to superficial wounds and grade 2 refers to wounds that penetrate to tendon or capsule. The University of Texas system also allows for specifying the presence of infection or ischemia in the wound.(61) [C in Context Link 1, 2]

Codes

CPT®: 97605, 97606, 97607, 97608

HCPCS: A6550, E2402

MCG Health
Ambulatory Care 30th Edition

Last Update: 1/25/2026 2:04:50 AM
Build Number: 30.0.2026012500524.025256